What is claimed is:

1. A method for anisotropically etching structures into a substrate (21) positioned in an etching chamber (12), in particular structures defined using an etching mask in a silicon substrate, using a plasma (22), an etching gas being used at least intermittently and a passivation gas being used at least intermittently,
wherein the passivation gas is supplied to the etching chamber (12) in cycles, the passivation gas cycles having a time period between 0.05 second and 1 second.

2. The method as recited in Claim 1,
wherein each of the passivation gas cycles has in particular an identical time period between 0.1 second and 0.5 second.

3. The method as recited in Claim 1 or 2,
wherein the etching gas is also supplied to the etching chamber (12) in cycles, each etching gas cycle having a time period between 1 second and 15 seconds, in particular 2 seconds to 7 seconds.

4. The method as recited in one of the preceding claims,
wherein the etching gas and the passivation gas are used alternately during separate etching steps and passivation steps, which are controlled independently of one another, the passivation gas being supplied to the etching chamber (12) at least largely only during the passivation gas steps and the etching gas, in particular SF_6, being supplied to the etching chamber (12) at least largely only during the etching steps.

5. The method as recited in one of the preceding claims,
wherein a gas selected from the group C_4F_8, C_3F_6, C_4F_6, C_5F_8, or $C_2H_2F_2$ or a gas mixture having at least one of these gases is used as the passivation gas.

6. The method as recited in one of the preceding claims, wherein the anisotropic etching is performed in separate, sequentially alternating etching and passivation steps, a polymer, in particular a Teflon-like polymer, being applied to the lateral delimitation of the structures, defined by the etching gas, with the aid of the passivation gas during the passivation steps, the polymer being at least partially eroded during the following etching step and redeposited in lower regions of the produced structure.

7. The method as recited in one of the preceding claims, wherein the duration of the passivation steps is set to be shorter than the duration of the etching steps by a factor of 10 to 30.

8. The method as recited in one of the preceding claims, wherein a high-density plasma (22) having at least 10^{12} reactive species/cm^3 is produced, and an in particular pulsed ion bombardment of the substrate (21), in particular having an ion energy from 1 eV to 100 eV in continuous wave operation or averaged over time, is performed at least intermittently during the etching steps.

9. The method as recited in one of the preceding claims, wherein the amount of passivation gas used during each of the individual passivation steps is reduced continuously or in steps as the etching progresses.

10. A plasma system for anisotropically etching structures into a substrate (21), in particular structures defined using an etching mask in a silicon substrate, having an etching chamber (12), in which the substrate (21) is positioned on a substrate electrode (20) in particular during operation of the plasma system (5), a plasma source (19), via which a plasma (22) acting on the substrate (21) can be produced, and means

(17, 23, 24, 25, 26, 27, 28, 29, 30) for supplying an etching gas at least intermittently and supplying a passivation gas at least intermittently to the etching chamber (12), wherein the means (17, 23, 24, 25, 26, 27, 28, 29, 30) are designed in such a way that the passivation gas is supplied to the etching chamber (12) in cycles, the passivation gas cycles having a time period between 0.05 second and 1 second.

11. The plasma system as recited in Claim 10, wherein the means (17, 23, 24, 25, 26, 27, 28, 29, 30) are designed in such a way and a pump device (31) is provided for evacuating the etching chamber (12) in such a way that the etching gas and the passivation gas are supplied to the etching chamber (12) alternately during separate, independently controlled etching and passivation steps, and the etching chamber (12) is at least approximately free of the passivation gas during the etching steps, at least in the region in which the plasma source (19) acts on the etching gas, and the etching chamber (12) is at least approximately free of the etching gas during the passivation steps, at least in the region in which the plasma source (19) acts on the passivation gas.

12. The plasma system as recited in one of Claims 10 or 11, wherein a passivation gas line (25) and a separate etching gas line (26) are provided and discharge directly into the etching chamber (12), or a passivation gas line (25) and a separate etching gas line (26) are provided and discharge directly upstream from the etching chamber (12), in particular at a distance of less than 20 cm, into a feed line (23) leading to the etching chamber (12).

13. The plasma system as recited in one of Claims 10 through 12,

wherein the passivation gas line (25) is provided, upstream from the etching chamber (12) or upstream from the discharge of the passivation gas line (25) into the feed line (23), with an inserted buffer tank (24) and a rapidly switching downstream passivation gas valve (28).

14. The plasma system as recited in one of Claims 10 through 13,
wherein the etching gas line (26) is provided with an etching gas valve (27), via which the supply of etching gas to the etching chamber (12) can be interrupted, in particular directly before passivation gas is supplied to the etching chamber (12).

15. The plasma system as recited in one of Claims 10 through 14,
wherein the etching gas valve (27) and/or the passivation gas valve (28) is/are positioned directly, in particular at a distance of less than 20 cm, upstream from the discharge of the etching gas line (26) and/or the passivation gas line (25) into the etching chamber (12) or the feed line (23).

16. The plasma system as recited in one of Claims 10 through 15,
wherein the etching gas valve (27) and the passivation gas valve (28) are combined into one changeover valve, via which the etching gas line (26) or the passivation gas line (25) are alternately connectable to the etching chamber (12) so gas can flow.

17. The plasma system as recited in Claim 13,
wherein the buffer tank has a volume of 0.1 L to 1 L.

18. The plasma system as recited in one of Claims 10 through 17,

wherein an inductively coupled plasma source (19) is provided in particular and the etching chamber (12) has an internal diameter of 5 cm to 20 cm at least in the region of the plasma source (19), so that when the plasma system (5) is operated and the plasma source (19) is powered via a high-voltage generator (15), a power per area of more than 5 watts/cm^2, in particular more than 15 watts/cm^2, is achievable inside the etching chamber (12) in the region of the plasma source (19) or at the location of the substrate (21).

19. The plasma system as recited in one of Claims 10 through 18,
wherein at least one coil (13, 14) which encloses the etching chamber (12), in particular at least two coils (13, 14) which enclose the etching chamber (12) externally, have a current flow through them in opposite directions in pairs during operation, and are positioned one below the other, are provided between the plasma source (19) and the substrate (21).

20. The plasma system as recited in one of the preceding claims,
wherein a method as recited in one of Claims 1 through 9 can be performed therewith.